

CLAIMS:

1. A hydrocracking process which comprises contacting a feed stream comprising hydrocarbons having boiling points between about 340°C and about 565°C with a catalyst comprising a hydrogenation component and
5 beta zeolite, which hydrogenation component comprises a metal component selected from the group consisting of nickel, cobalt, tungsten, molybdenum, and any combination thereof, which beta zeolite has a silica:alumina molar ratio of less than 30:1 and a SF₆ adsorption capacity of at least 28 wt-%.
2. The process of claim 1 further characterized in that the catalyst
10 contains a support and the catalyst contains a positive amount less than 3 wt-% beta zeolite based on the combined weight of the beta zeolite and the support on a volatile-free basis.
3. The process of claim wherein the silica:alumina molar ratio is and less than 25:1.
- 15 4. The process of claim 3 wherein the silica:alumina molar ratio is more than 9:1.
5. The process of claim 1 further characterized in that the catalyst contains a support and the catalyst contains a positive amount less than 2 wt-% beta zeolite based on the combined weight of the beta zeolite and the
20 support on a volatile-free basis.
6. The process of claim wherein the silica:alumina molar ratio is more than 9:1 and less than 25:1.
7. The process of claim 1 further characterized in that the catalyst contains a support and the catalyst contains a positive amount less than 1 wt-% beta zeolite based on the combined weight of the beta zeolite and the
25 support on a volatile-free basis.
8. The process of claim 1 further characterized in that the catalyst contains a support and the catalyst contains a positive amount less than 0.5

wt-% beta zeolite based on the combined weight of the beta zeolite and the support on a volatile-free basis.

9. The process of claim 1 wherein the support comprises a refractory inorganic oxide selected from the group consisting of alumina, silica-alumina, silica, zirconia, titania, boria, and zirconia-alumina, and any combination thereof.

10. The process of claim 1 further characterized in that the catalyst is sulfided prior to contacting with the feed stream.

11. The process of claim 1 wherein the feed stream contains more than 0.01 wt-% nitrogen.

12. The process of claim 1 further characterized in that the beta zeolite has not been treated by steaming to increase its selectivity to the production of middle distillate products prior to the contacting with the feed stream.

13. The process of claim 1 further characterized in that the beta zeolite has been treated by steaming at hydrothermal conditions comprising a temperature of less than or equal to 650°C prior to the contacting with the feed stream.

14. The process of claim 13 wherein the hydrothermal conditions comprise a steam content of a positive amount less than or equal to 10 mol-% based on the weight of vapors contacting the zeolite beta and a time of a positive amount less than or equal to 2 hours.

15. The process of claim 1 further characterized in that the beta zeolite has been treated by steaming at hydrothermal conditions comprising a temperature of less than or equal to 600°C prior to the contacting with the feed stream.

16. The process of claim 15 wherein the hydrothermal conditions comprise a steam content of a positive amount less than or equal to 5 mol-% based on the weight of vapors contacting the zeolite beta and a time of a positive amount less than or equal to 2 hours.

17. A hydrocracking process which comprises contacting a feed stream comprising hydrocarbons having boiling points between about 340°C and about 565°C with a catalyst comprising a hydrogenation component, a support, and beta zeolite, which beta zeolite has a silica:alumina molar ratio of less than 30:1 and a SF₆ adsorption capacity of at least 28 wt-%, which beta zeolite has not been treated by steaming prior to the contacting with the feed stream, which catalyst contains a positive amount less than 1.5 wt-% beta zeolite based on the combined weight of the beta zeolite and the support on a volatile-free basis.

18. The process of claim 17 wherein the silica:alumina molar ratio is less than 25:1.

19. The process of claim 18 wherein the silica:alumina molar ratio is more than 15:1.

20. The process of claim 17 wherein the catalyst contains a positive amount less than 1 wt-% beta zeolite based on the combined weight of the beta zeolite and the support on a volatile-free basis.

21. The process of claim 20 wherein the hydrogenation component comprises a metal component selected from the group consisting of nickel, cobalt, tungsten, molybdenum, and any combination thereof.

22. A hydrocracking process which comprises contacting a feed stream comprising hydrocarbons having boiling points between about 340°C and about 565°C with a catalyst comprising a hydrogenation component, a support, and beta zeolite, which beta zeolite has a silica:alumina molar ratio of less than 30:1 and a SF₆ adsorption capacity of at least 28 wt-%, which beta zeolite has been treated by steaming at a temperature of less than 650°C and for a time of a positive amount less than 2 hours prior to the contacting with the feed stream, which catalyst contains a positive amount less than 2 wt-% beta zeolite based on the combined weight of the beta zeolite and the support on a volatile-free basis.

23. The process of claim 22 wherein the catalyst contains a positive amount less than 1 wt-% beta zeolite based on the combined weight of the beta zeolite and the support on a volatile-free basis.

5 24. The process of claim 23 wherein the hydrogenation component comprises a metal component selected from the group consisting of nickel, cobalt, tungsten, molybdenum, and any combination thereof.

25. The process of claim 22 wherein the silica:alumina molar ratio is less than 25:1.

10 26. The process of claim 25 wherein the silica:alumina molar ratio is more than 9:1.